No. 778,637. PATENTED DEC. 27, 1904.

E. H. COTTRELL.

MACHINE FOR FOLDING PAPER OR OTHER FABRICS.

APPLICATION FILED JUNE 14, 1904.

4 SHEETS—SHEET 1.

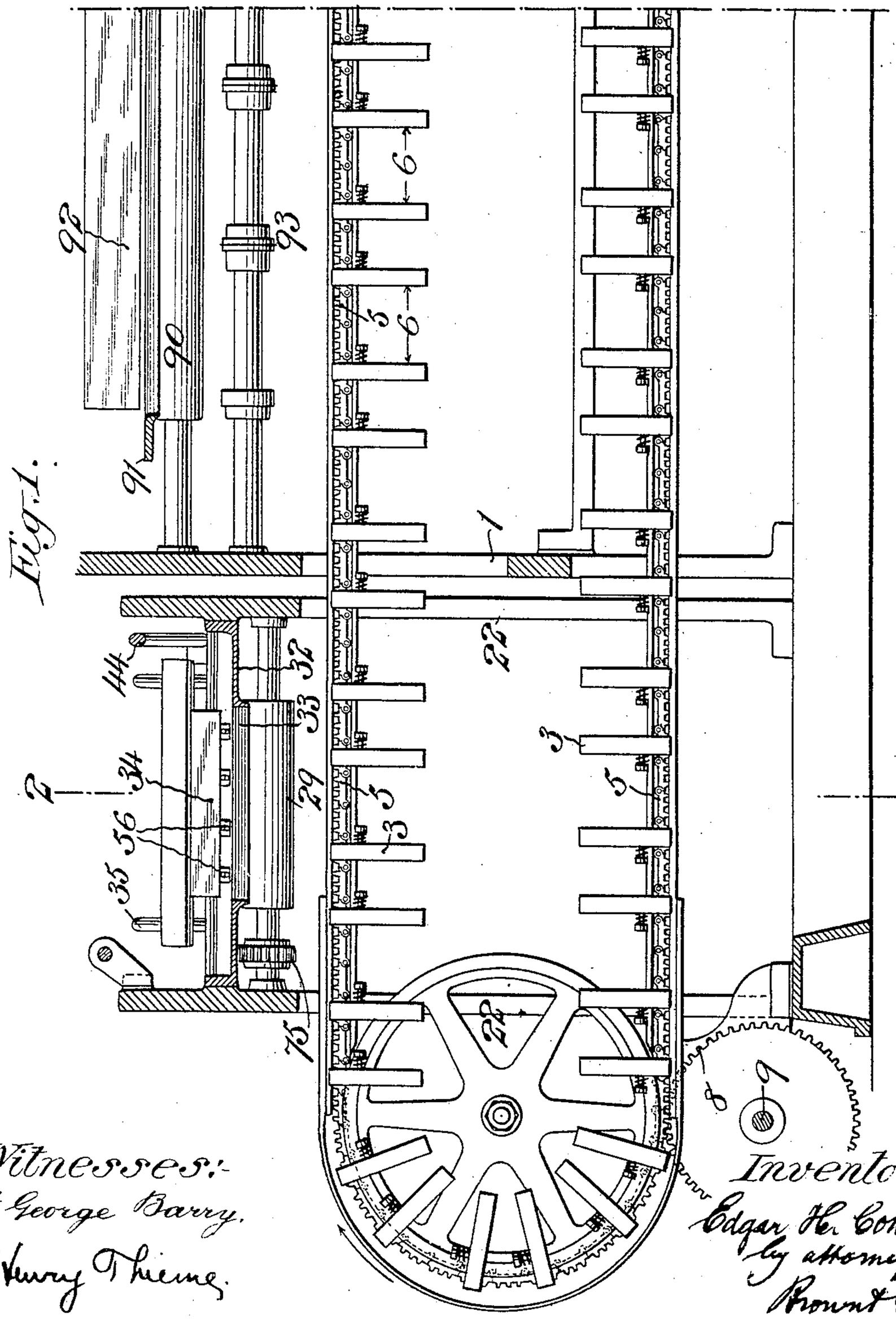

Fig. 1.

Witnesses:-
F. George Barry.
Henry Thieme.

Inventor:-
Edgar H. Cottrell
by attorneys
Brown & Lavard

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4 SHEETS—SHEET 2.

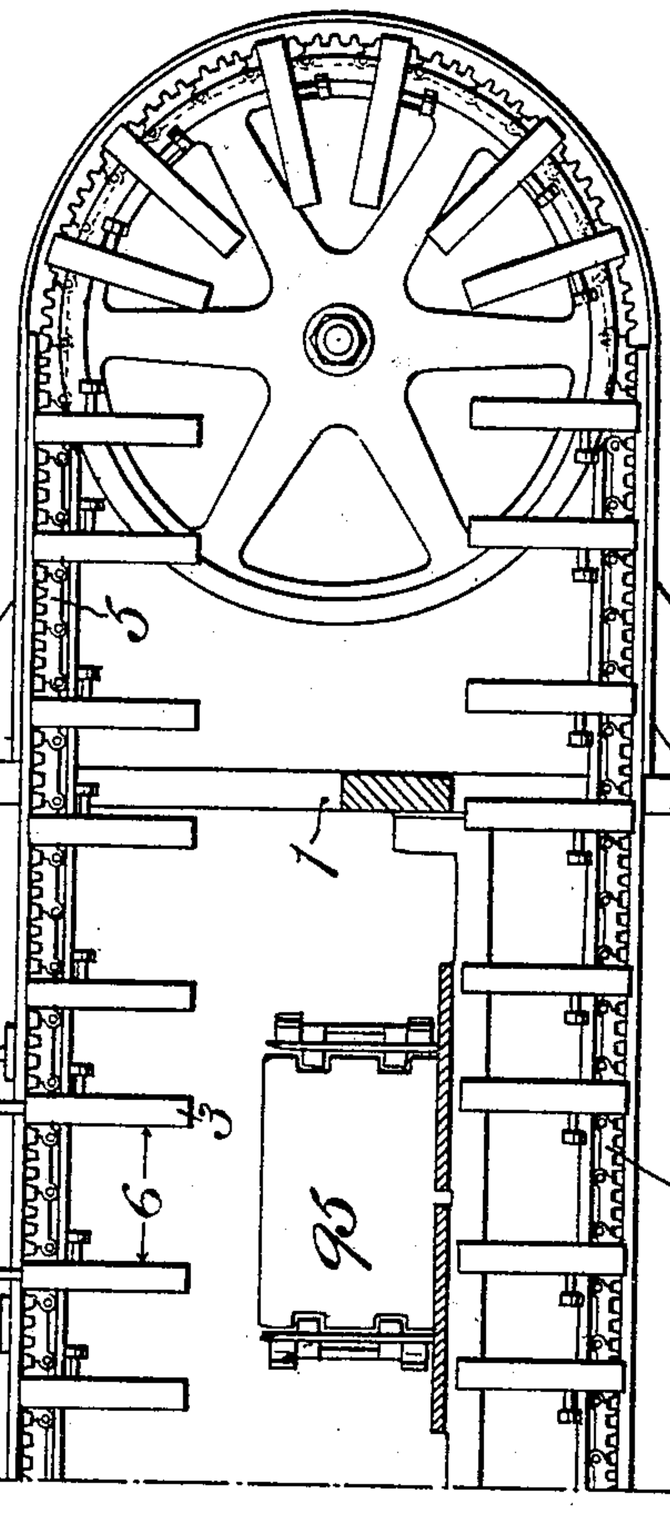

Fig. 1.

Witnesses:-
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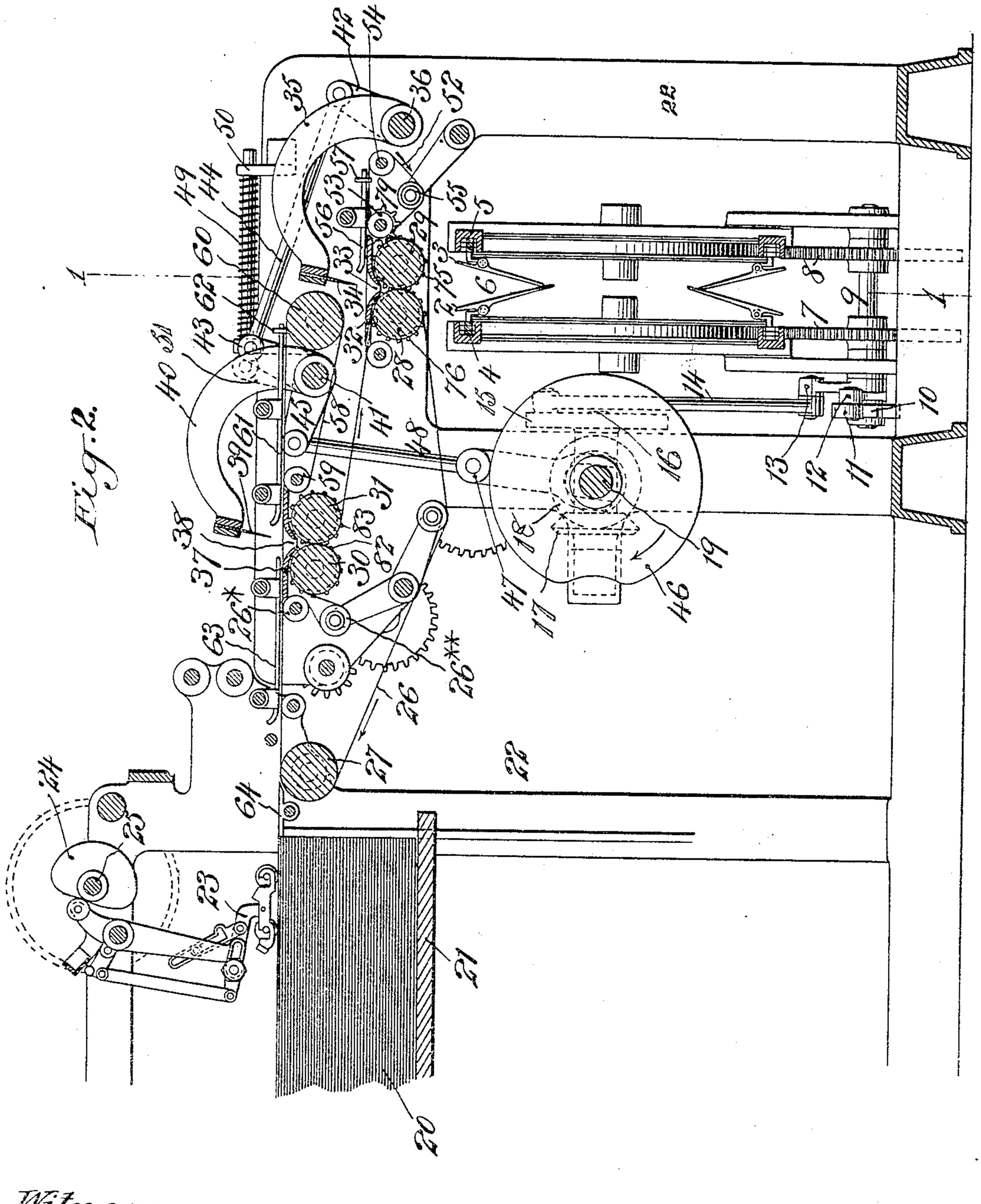
4 SHEETS—SHEET 3.

Fig. 2.



Witnesses:-

F. George Barry,

Frederick G. Hachenberg.

Inventor:-

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4 SHEETS—SHEET 4.

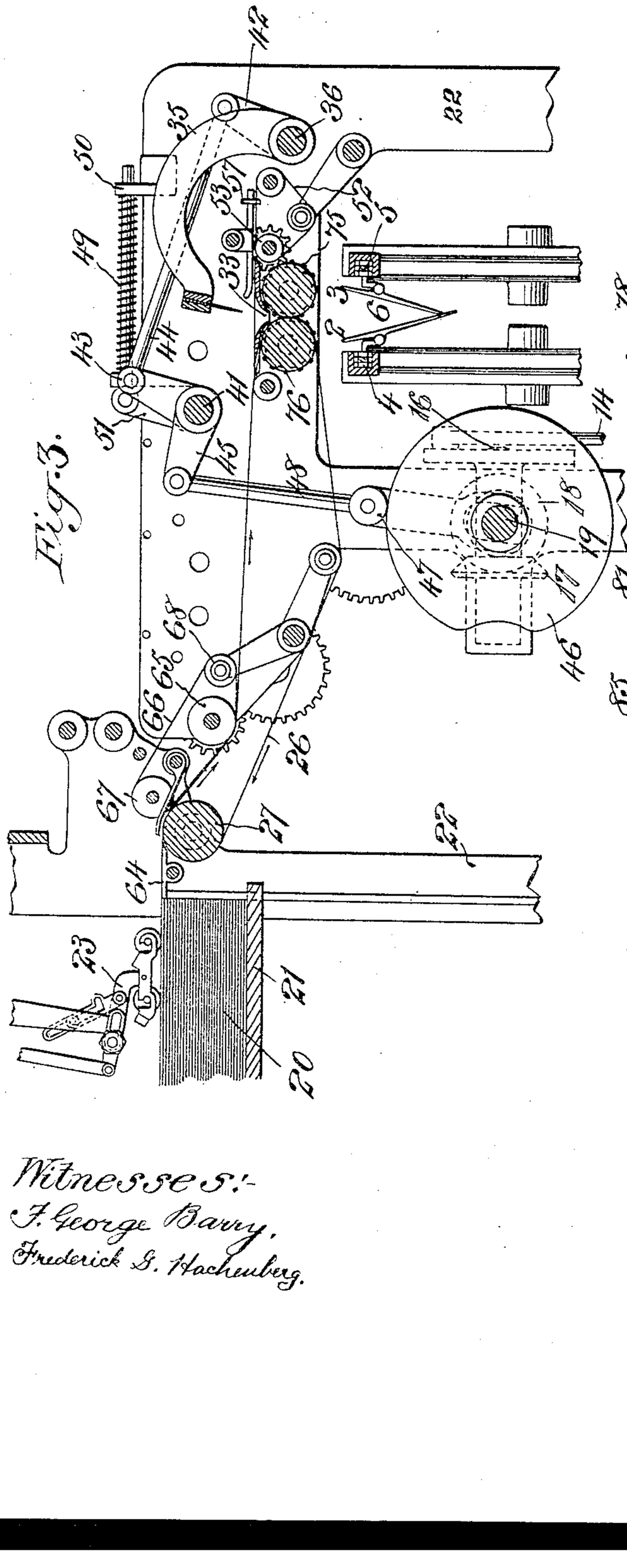

Fig. 3.

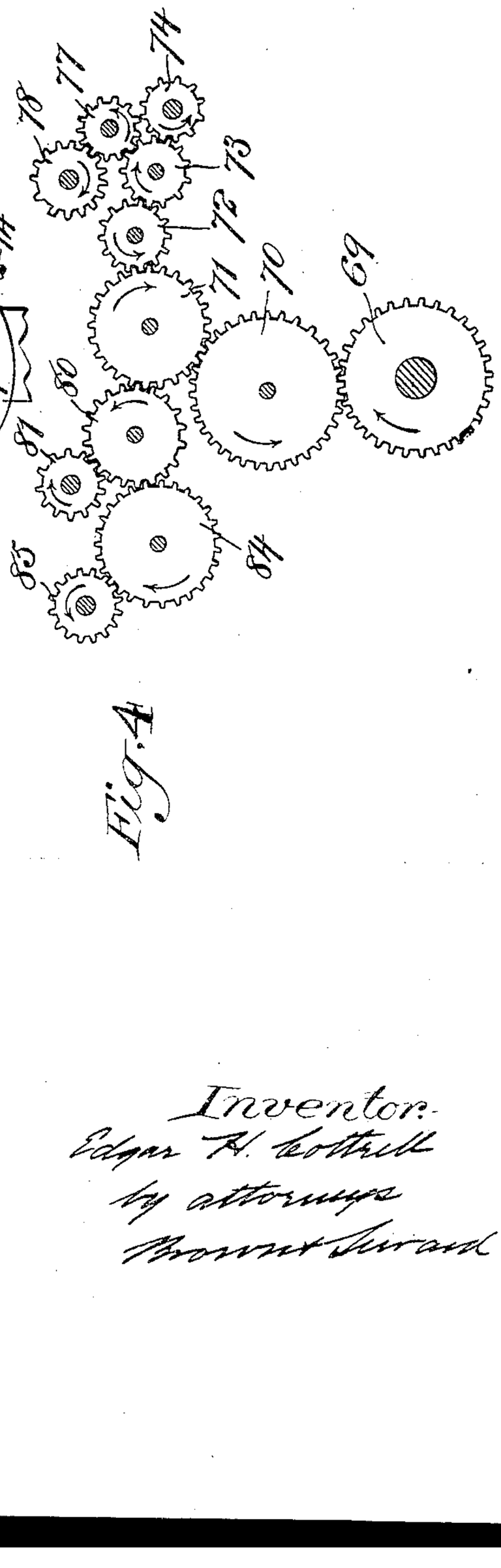

Fig. 4

Witnesses:-
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No. 778,637. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

EDGAR H. COTTRELL, OF STONINGTON, CONNECTICUT, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

MACHINE FOR FOLDING PAPER OR OTHER FABRICS.

SPECIFICATION forming part of Letters Patent No. 778,637, dated December 27, 1904.

Application filed June 14, 1904. Serial No. 212,467.

To all whom it may concern:

Be it known that I, EDGAR H. COTTRELL, a citizen of the United States, and a resident of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Machines for Folding Paper or other Fabrics, of which the following is a specification.

The object of my present invention is to fold sheets from different sources of supply and to associate the folded sheets in such manner that those from one source of supply form covers or outsides to signatures composed of sheets from the other source of supply.

Machinery embodying the invention in its entirety comprises a folder for the outside or cover sheets, a folder for the signature-sheets, and a carrier for receiving the folded outside or cover sheets from their folder and carrying them to the folder of the signature-sheets, which after folding the latter sheets deposits them inset within the folded outside or cover sheets in the carrier. Such a machine may be adapted either to fold the outer sheet only once to form merely a cover to the signature received within it or to give the outer sheet a plurality of folds for the purpose of adding a number of pages to the signature.

The invention consists in the combinations hereinafter described and claimed, in which the said folders and carrier constitute elements.

Figures 1 and 1* represent a longitudinal vertical section of the principal parts of a machine embodying my invention, taken in the line 1 1 of Fig. 2 and viewed from the left. Fig. 2 represents a transverse vertical section corresponding with Fig. 1, taken in the line 2 2 of that figure and viewed from the right. Fig. 3 is a view similar to Fig. 2 of a modified form of machine containing a single cover-folder instead of a plurality of such folders, as in Fig. 2. Fig. 4 is a view showing the geared connection between the several mechanisms suitable for the form shown in both Figs. 2 and 3.

I have illustrated this invention in connection with the machinery for folding signatures which forms the subject-matter of United States Letters Patent No. 749,362, dated January 12, 1904.

The framing of the signature-folding machine is denoted by 1. The endless pocketed carrier is denoted by 2 3, and it has racks 4 5, which support a plurality of pockets 6. This carrier resembles that in the machine described in the aforesaid patent, except that it is sufficiently longer to extend beyond the framing 1 under the cover-folding mechanism shown above it at the left-hand end of Fig. 1. The said carrier has imparted to it an intermittent or step-by-step movement. The means which I have shown for producing this movement are like those shown in the aforesaid patent. They comprise two gears 7 8, carried by a short shaft 9, mounted in suitable bearings carried by the framing, the said gears intermeshing with the racks 4 5 of the carrier. A four-toothed ratchet-wheel 10 is carried by the shaft 9, and a pawl 11, carried by one arm of a lever 12 13, coacts with the wheel 10 to rotate the shaft 9 step by step when a connecting-rod 14 operates the lever 12 13. This rod 14 is connected to a crank-arm 15, carried by a shaft 16, which is driven by a bevel-gear connection 17 18 between the shaft 16 and the cam-shaft 19.

Above the carrier 2 3 4 5 6 is arranged the signature-folder, consisting of a pair of folding-rollers 90, one of which is shown in Figs. 1 and 1*, and a slotted plate 91, on which are placed the sheets to be folded by means of the folding-blade 92 and the said rollers. The said folding-rollers are parallel with the direction of the run of the endless carrier, and under said rollers between them and the carrier there is arranged a rotary slitter 93. The said folding-rollers, plate, blade, and slitter are like those described in the aforesaid Letters Patent and may be actuated and operate in the same way, and therefore need no further description here.

At one end of the framing 1 there is an auxiliary framing 22, which supports the cover-folding mechanism hereinbefore mentioned and to be presently described. The

same framing 22 also supports the table 21, on which is placed by hand or suitable means a pile of cut sheets 20 of suitable size. These sheets are fed in a direction crosswise of the run of the carrier toward said folding mechanism to be folded by the latter, and thereby deposited in the carrier. This feeding of the outside or cover sheets may be effected by any suitable means — for example, by the feeder 23, (shown in Fig. 2,) which is the subject of United States Letters Patent No. 726,386. The mechanism for operating this feeder being well known is only represented by the cam 24 and its shaft 25.

The outside or cover folding mechanism represented in Fig. 2 consists of two separate folders operating in succession. One of these folders is represented as consisting of a pair of folding-rollers 28 29, a slotted table 32 33, and a folding-blade 34, located over the carrier 2 3 4 5 6, and the other is represented as consisting of folding-rollers 30 31, a slotted table 37 38, and a folding-blade 39 and is located between the feeder 23 and the folder 28 29 32 33 34. All of said folding-rollers are parallel with the signature-folding rollers 90. Endless carrier-tapes 26 lead around a roller 27, mounted in the framing 22 adjacent to the pile of sheets 20. These tapes also pass around the folding-roller 28 and pass between the folding-rollers 30 31 and around a roller 26* and a take-up roller 26** adjacent to the folding-roller 30. The folding-blade 34 is carried by the arm 35, which is fixed to a rock-shaft 36, supported in the framing 22. The folding-blade 39 is carried by the arm 40 of the rock-shaft 41. The rock-shafts 36 and 41 are provided with arms 42 43, connected to move together by a bar 44. The rock-shaft 41 is further provided with an arm 45, which is operated at predetermined intervals by a cam 46, carried by the shaft 19, which cam engages a stud or roller 47, carried by a rod 48, one end of which rod has a forked engagement with the shaft 19 for guiding the rod in its longitudinal movements. A spring 49 is provided for swinging the blades 34 and 39 downwardly into the folding position, which spring is interposed between the stop 50, carried by the framing 22, and an arm 51, fixed to the rock-shaft 41.

Endless carrier-tapes 52 pass around a roller 53 adjacent to the folding-roller 29 and around rollers 54 55, serving as a supplementary carrier forming an extension of the folding-table 32. The roller 55 is mounted as a tension-roller. Stationary guard-rods 56 are secured over the table 32 and supplementary carrier, which guard-rods are provided with stops 57 for stopping the sheets in the proper position for folding.

Endless carrier-tapes 58 pass around a roller 59, adjacent to the folding-roller 31, and a second roller 60, producing a supplementary carrier forming an extension to the folding-table 37. Stationary guard-rods 61 are arranged over the table 37 and supplementary carrier, which guard-rods are provided with stops 62 for stopping the sheets in the proper position for folding. Stationary guard-rods 63 are located over the folding-table 37 and a portion of the carrier 26 for guiding the sheets into position on the said table.

A short table 64 is interposed between the pile 20 of outside or cover sheets and the roller 27 of the main sheet-carrier for directing the sheets onto the carrier as they are fed from the pile by the feeding device 23.

The two outside or cover folders are at such distances apart and their respective carrying-tapes of such length that each sheet supplied from the pile 20 is first folded at the middle of its length by the folding-rollers 30 31 and blade 39 and after its delivery by said rollers thus folded is carried by the tapes 26 58 to the folding-rollers 28 29 and blade 34 to be thereby folded again half-way between the first fold and its edges, thus producing an outside cover or sheet of eight pages in four leaves, which by the rollers 28 29 is carried downward and dropped into one of the pockets of the carrier 2 3 4 5 6 to receive inset within it a signature which has been folded by the rollers 90 and blade 92.

The gearing for operating this cover-folding mechanism is as follows: A spur-gear 69 on the shaft 19 meshes with a spur-gear 70, which in turn meshes with a spur-gear 71. This spur-gear 71 meshes with a spur-gear 72, which in turn meshes with a spur-gear 73, and the last-named gear meshes with a spur-gear 74 on the shaft of the folding-roller 29, thus imparting a movement to the folding-roller in the proper direction. This folding-roller 29 is provided with a spur-gear 75, (shown in Fig. 2,) which intermeshes with a spur-gear 76, carried by the folding-roller 28. A spur-gear 77 intermeshes with the gear 73, and a spur-gear 78, carried by the roller 60, meshes with a gear 77. A spur-gear 79, carried by the roller 53, meshes with the spur-gear 74. Thus movement is imparted to the two supplementary carriers in the proper direction. A spur-gear 80 meshes with the spur-gear 71, and the spur-gear 81 on the shaft of the folding-roller 30 meshes with the gear 80. Another spur-gear, 82, on the shaft of the roller 30 meshes with a spur-gear 83 on the shaft of the roller 31 for causing the two rollers to rotate in the proper direction with respect to each other.

The operation of the machine with the cover-folding mechanism shown in Fig. 2 is as follows: The sheets for signatures being presented to the folding devices 90 91 92 at suitable intervals by any suitable means—for instance, as described in United States Letters Patent No. 749,362—are folded and carried by said devices through the slitter 93,

and thereby slit into a number of smaller folded sheets, which are deposited in as many pockets 6 of the carrier and collected therein in groups to form signatures therein in the manner described in said Letters Patent; but before such deposit of said folded sheets and their collection in a group in any pocket to form a signature therein that pocket had received a folded outside or cover sheet, and consequently the collected group of sheets forming the signature is inset within the separately-folded outside or cover sheet.

I have represented in Fig. 1* a packer 95 between the upper and lower runs of the signature-carrier for the reception of the covered signatures; but this is no part of the present invention.

In the example represented in Fig. 3, in which a single folding device only is used, the intermediate folding device being eliminated, the endless carrier-tapes 26 pass under a roller 65 and from thence to the folding-roller 28. Another set of endless carrier-tapes 66 pass beneath the roller 65 and also around a roller 67, adjacent to the roller 27, and a take-up roller 68. The sheets from the separate source of supply are thus led between the tapes 26 and 66 and from thence conveyed to the folding device. In all other respects this mechanism is quite similar to that described with reference to Fig. 2.

When a single folding device is to be used, as represented in Fig. 3, a spur-gear 84, which meshes with the spur-gear 80, drives a spur-gear 85, carried by the shaft of the roller 65, thus imparting a movement in the proper direction to the carrier-tapes 66 of the supplementary carrier.

It is to be understood that by a proper timing of the operations of the outside or cover sheet feeder and the folders one or more outside or cover sheets may be fed to each pocket in the carrier before the pocket receives the signature and that the said outside or cover sheets may be either mere covers or extra page-sheets, as desired.

What I claim as my invention is—

1. In a folding-machine, a carrier for conveying groups of sheets, a separate source of sheet-supply, means for feeding sheets therefrom to the carrier at intervals and a device for folding the sheets before they are fed to the carrier.

2. In a folding-machine, a carrier for conveying groups of sheets, a separate source of cover-sheet supply, means for feeding cover-sheets therefrom to the carrier at intervals, and a device for folding the cover-sheets before they are fed to the carrier.

3. In a folding-machine, a carrier for conveying groups of sheets, a separate source of sheet-supply, means for feeding sheets therefrom to the carrier at intervals and devices for folding the sheets from the separate source of supply before they are fed to the carrier.

4. In a folding-machine, a carrier for conveying groups of sheets, a separate source of cover-sheet supply, means for feeding the cover-sheets therefrom to the carrier at intervals, and devices for folding the cover-sheets before they are fed to the carrier.

5. In a folding-machine, a carrier for conveying groups of sheets, a separate source of sheet-supply and means for folding sheets from the separate source of sheet-supply and feeding them to the carrier at intervals to be thereafter combined with the groups of sheets.

6. In a folding-machine, a carrier for conveying groups of sheets, a separate source of sheet-supply, a folding device, means for feeding sheets from the separate source of sheet-supply to the folding device and means for feeding the folded sheets from the folding device to the carrier.

7. In a folding-machine, a carrier for conveying groups of sheets, a separate source of sheet-supply, folding devices, means for feeding sheets from the separate source of sheet-supply to one folding device, means for feeding the sheets from said folding device to a succeeding folding device and means for feeding the sheets therefrom to the carrier at intervals, to be thereafter combined with said groups of sheets.

8. In a folding-machine, a carrier having pockets therein for receiving groups of sheets, a separate source of sheet-supply, a folding device and means for feeding sheets therefrom to said pockets to be thereafter combined with the groups of sheets.

9. In a folding-machine, a carrier having pockets therein for receiving groups of sheets, a separate source of sheet-supply, a folding device, means for feeding sheets from the separate source of sheet-supply to the folding device and means for feeding the folded sheets to the pockets in the carrier to be thereafter combined with the groups of sheets.

10. In a folding-machine, a folder for folding outside or cover sheets, a separate folder for folding signatures, and a carrier for carrying already-folded outside or cover sheets to a position under the signature-folder for the reception inset within them of the folded signatures.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 10th day of June, 1904.

EDGAR H. COTTRELL.

Witnesses:
FREDK. HAYNES,
LIDA M. EGBERT.